

## IMAGES IN INTERVENTION

# Very Late Thrombosis of a Transcatheter Aortic Valve-in-Valve

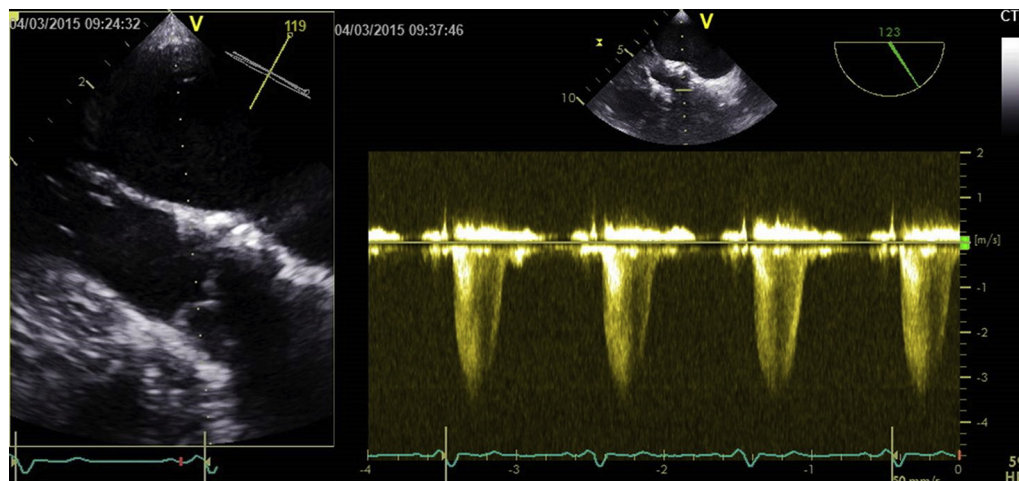


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An 85-year-old man presented with dyspnea New York Heart Association functional class IV 4 years after implantation of a 26-mm CoreValve transcatheter aortic valve (TAV) (Medtronic, Minneapolis, Minnesota). Angiography revealed

severe aortic regurgitation due to the deep position of the prosthesis ([Online Video 1](#)), and a 23-mm SAPIEN XT (Edwards Lifesciences, Irvine, California) valve-in-valve implantation was performed. Mid-term follow-up was favorable; clopidogrel was dis-

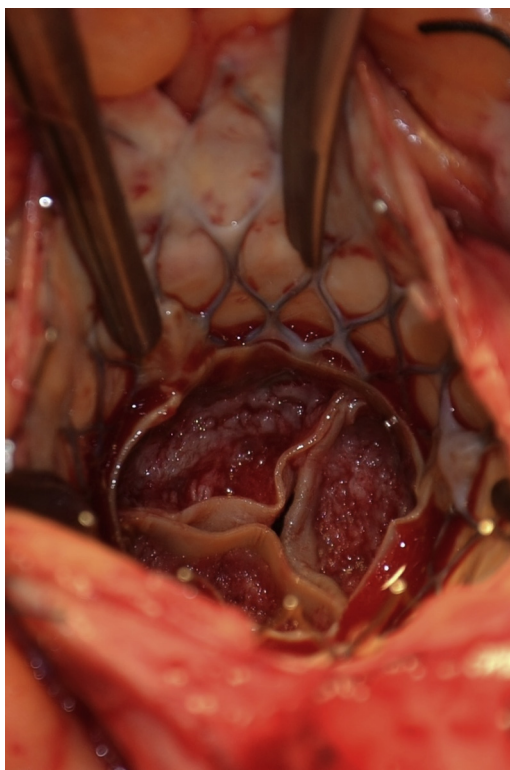
**FIGURE 1** Multiplane Transesophageal Echocardiography



(Left) Homogeneous thickening of the SAPIEN XT (Edwards Lifesciences, Irvine, California) cusps, with neither significant calcification nor mobile images. (Right) Elevated transvalvular velocities. See [Online Videos 1, 2, and 3](#).

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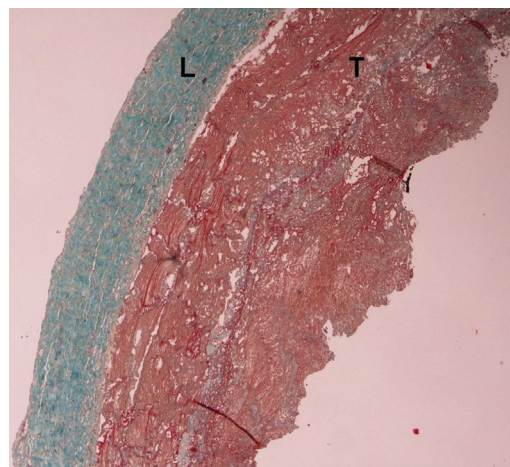
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**FIGURE 2** Operative Findings Revealing Thrombotic Material Adhered to the 3 Aortic Cusps

Note the endothelialization of the CoreValve (Medtronic, Minneapolis, Minnesota) frame and the proper expansion of the SAPIEN XT valve (Edwards Lifesciences, Irvine, California).

continued 15 months after the SAPIEN XT valve implantation, and aspirin monotherapy continued thereafter.

Two months after clopidogrel discontinuation, the patient required 3 visits to the emergency department with overt heart failure. Echocardiography showed high transvalvular gradients (peak, 55 mm Hg; mean, 31 mm Hg; dimensionless valve index, 0.25), thickened leaflets, and mild to moderate central aortic regurgitation (**Figure 1**, **Online Videos 2** and **3**). The heart team decided to perform a surgical aortic valve replacement. Operative and pathology findings revealed a diffuse fibrin-platelet thrombus adhered to the aortic surface on the 3 SAPIEN XT valve cusps (**Figures 2** and **3**). This valve was partially denuded and easily extracted from within the CoreValve prosthesis. Both TAVs were explanted via a

**FIGURE 3** Pathologic Sample of a Thrombosed Leaflet

Masson trichrome-stained section of a thrombosed leaflet, with lines of Zahn present and without fibrosis or calcification within the thrombus (magnification,  $\times 4$ ). L = leaflet; T = thrombus.

longitudinal aortotomy, and a 21-mm bioprosthesis was sutured to the well-preserved aortic annulus. Unfortunately, the patient died of cardiac arrest in the postoperative period.

Valve thrombosis is a rare but increasingly recognized complication of transcatheter heart valves. Indeed, a systematic review has shown that thrombosis is the major cause of valve stenosis in the early years after implantation (**1**). As in this case, TAV thrombosis is usually not associated with typical thrombus images on transesophageal echocardiography, and operators must be cautious when handling catheters in the vicinity of a stenotic TAV (**1,2**).

Balloon-expandable prostheses are sometimes used to reduce aortic regurgitation after CoreValve implantation (**3**). Our findings suggest that in this setting, internal prosthesis endothelialization may be delayed or incomplete, representing an additional risk factor for late thrombosis. Therefore, TAV-in-TAV therapies with balloon-expandable valves might require longer duration of dual-antiplatelet therapy.

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## REFERENCES

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2. De Backer O, Ihlemann N, Olsen NT, et al. Intracardiac echocardiography unveils large thrombus on a restenotic TAVR prosthesis more than 6 years after implantation. *Eur Heart J* 2015 Mar 22 [E-pub ahead of print].
3. Diemert P, Lange P, Greif M, et al. Edwards Sapien XT valve placement as treatment option for aortic regurgitation after transfemoral CoreValve implantation: a multicenter experience. *Clin Res Cardiol* 2014;103:183-90.

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**KEY WORDS** aortic valve stenosis, thrombus, transcatheter aortic valve implantation, valve-in-valve

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 **APPENDIX** For supplemental videos, please see the online version of this paper.